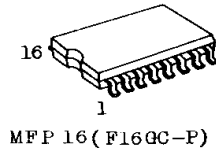
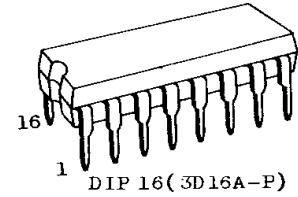


# TC5012BP/BF

C<sup>2</sup>MOS DIGITAL INTEGRATED CIRCUIT  
SILICON MONOLITHIC

## TC5012BP/TC5012BF HEX NON-INVERTING 3-STATE BUFFER

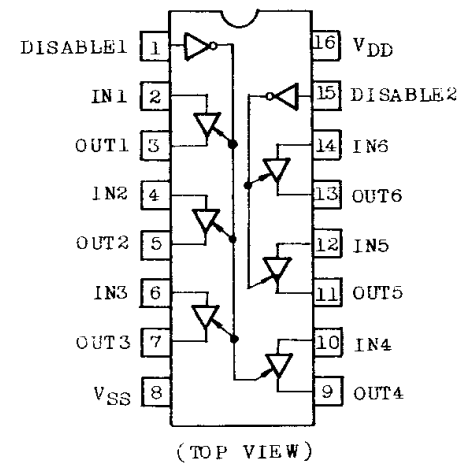
TC5012BP/BF contains six circuits of non-inverting buffers having three state output. Since DISABLE inputs to disable the outputs are provided separately, one common for four circuits and another common for other two circuits, this is suitable for controlling four bit data lines. Large output current enables to directly control one TTL input.



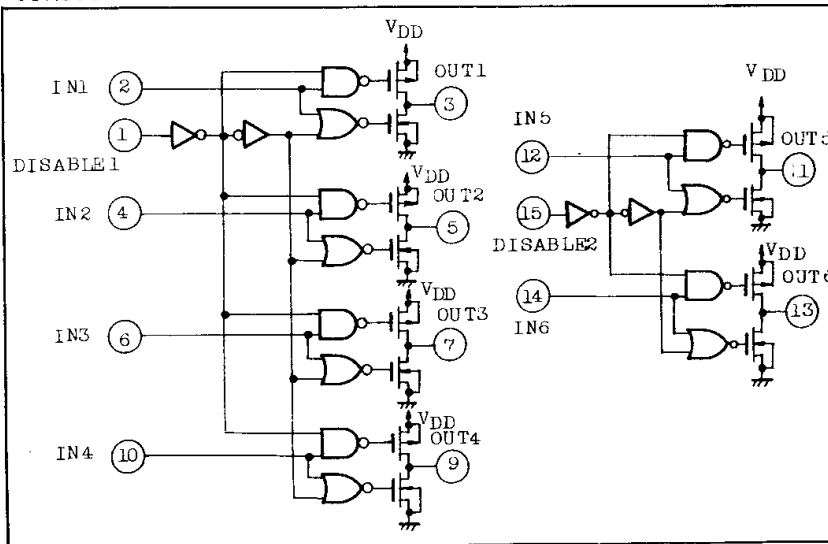
### ABSOLUTE MAXIMUM RATINGS

| CHARACTERISTIC              | SYMBOL           | RATING  | UNIT |
|-----------------------------|------------------|---|------|
| DC Supply Voltage           | V <sub>DD</sub>  | V <sub>SS</sub> - 0.5 ~ V <sub>SS</sub> + 20  | V    |
| Input Voltage               | V <sub>IN</sub>  | V <sub>SS</sub> - 0.5 ~ V <sub>DD</sub> + 0.5 | V    |
| Output Voltage              | V <sub>OUT</sub> | V <sub>SS</sub> - 0.5 ~ V <sub>DD</sub> + 0.5 | V    |
| DC Input Current            | I <sub>IN</sub>  | ±10   | mA   |
| Power Dissipation           | P <sub>D</sub>   | 300 (DIP) / 180 (MFP)                         | mW   |
| Operating Temperature Range | T <sub>A</sub>   | -40 ~ 85                                      | °C   |
| Storage Temperature Range   | T <sub>stg</sub> | -65 ~ 150                                     | °C   |
| Lead Temp./Time             | T <sub>sol</sub> | 260°C · 10 sec                                |      |

### PIN ASSIGNMENT



### CIRCUIT DIAGRAM



### TRUTH TABLE

| DISABLE INPUT | INPUT | OUTPUT |
|---------------|-------|--------|
| L             | L     | L      |
| L             | H     | H      |
| H             | *     | HZ     |

\* : DON'T CARE  
HZ : HIGH IMPEDANCE

RECOMMENDED OPERATING CONDITIONS (V<sub>SS</sub>=0V)

| CHARACTERISTIC    | SYMBOL          | MIN. | TYP. | MAX.            | UNITS |
|-------------------|-----------------|------|------|-----------------|-------|
| DC Supply Voltage | V <sub>DD</sub> | 3    | -    | 18              | V     |
| Input Voltage     | V <sub>IN</sub> | 0    | -    | V <sub>DD</sub> | V     |

STATIC ELECTRICAL CHARACTERISTICS (V<sub>SS</sub>=0V)

| CHARACTERISTIC                 | SYMBOL          | TEST CONDITION  | V <sub>DD</sub><br>(V) | -40°C |      | 25°C  |       |                   | 85°C  |      | UNITS |    |
|--------------------------------|-----------------|---|------------------------|-------|------|-------|-------|-------------------|-------|------|-------|----|
|                                |                 |   |                        | MIN.  | MAX. | MIN.  | TYP.  | MAX.              | MIN.  | MAX. |       |    |
| High-Level Output Voltage      | V <sub>OH</sub> | I <sub>OUT</sub>   < 1μA<br>V <sub>IN</sub> =V <sub>SS</sub> , V <sub>DD</sub>  | 5                      | 4.95  | -    | 4.95  | 5.00  | -                 | 4.95  | -    | V     |    |
|                                |                 |   | 10                     | 9.95  | -    | 9.95  | 10.00 | -                 | 9.95  | -    |       |    |
|                                |                 |   | 15                     | 14.95 | -    | 14.95 | 15.00 | -                 | 14.95 | -    |       |    |
| Low-Level Output Voltage       | V <sub>OL</sub> | I <sub>OUT</sub>   < 1μA<br>V <sub>IN</sub> =V <sub>SS</sub> , V <sub>DD</sub>  | 5                      | -     | 0.05 | -     | 0.00  | 0.05              | -     | 0.05 | V     |    |
|                                |                 |   | 10                     | -     | 0.05 | -     | 0.00  | 0.05              | -     | 0.05 |       |    |
|                                |                 |   | 15                     | -     | 0.05 | -     | 0.00  | 0.05              | -     | 0.05 |       |    |
| Output High Current            | I <sub>OH</sub> | V <sub>OH</sub> =4.6V<br>V <sub>OH</sub> =2.5V<br>V <sub>OH</sub> =9.5V<br>V <sub>OH</sub> =13.5V<br>V <sub>IN</sub> =V <sub>SS</sub> , V <sub>DD</sub> | 5                      | -     | -    | -     | -     | -                 | -     | -    | mA    |    |
|                                |                 |   | 5                      | -1.4  | -    | -1.25 | -     | -                 | -1.0  | -    |       |    |
|                                |                 |   | 10                     | -1.4  | -    | -1.25 | -     | -                 | -3.0  | -    |       |    |
|                                |                 |   | 15                     | -4.0  | -    | -3.75 | -     | -                 | -3.0  | -    |       |    |
| Output Low Current             | I <sub>OL</sub> | V <sub>OL</sub> =0.4V<br>V <sub>OL</sub> =0.5V<br>V <sub>OL</sub> =1.5V<br>V <sub>IN</sub> =V <sub>SS</sub> , V <sub>DD</sub>                           | 5                      | 3.5   | -    | 3.2   | -     | -                 | 2.5   | -    | mA    |    |
|                                |                 |   | 10                     | 6.0   | -    | 5.0   | -     | -                 | 3.6   | -    |       |    |
|                                |                 |   | 15                     | 26.0  | -    | 24.0  | -     | -                 | 18.0  | -    |       |    |
| Input High Voltage             | V <sub>IH</sub> | V <sub>OUT</sub> =0.5V, 4.5V<br>V <sub>OUT</sub> =1.0V, 9.0V<br>V <sub>OUT</sub> =1.5V, 13.5V<br> I <sub>OUT</sub>   < 1μA                              | 5                      | 3.5   | -    | 3.5   | 2.75  | -                 | 3.5   | -    | V     |    |
|                                |                 |   | 10                     | 7.0   | -    | 7.0   | 5.5   | -                 | 7.0   | -    |       |    |
|                                |                 |   | 15                     | 11.0  | -    | 11.0  | 8.25  | -                 | 11.0  | -    |       |    |
| Input Low Voltage              | V <sub>IL</sub> | V <sub>OUT</sub> =0.5V, 4.5V<br>V <sub>OUT</sub> =1.0V, 9.0V<br>V <sub>OUT</sub> =1.5V, 13.5V<br> I <sub>OUT</sub>   < 1μA                              | 5                      | -     | 1.5  | -     | 2.25  | 1.5               | -     | 1.5  | V     |    |
|                                |                 |   | 10                     | -     | 3.0  | -     | 4.5   | 3.0               | -     | 3.0  |       |    |
|                                |                 |   | 15                     | -     | 4.0  | -     | 6.75  | 4.0               | -     | 4.0  |       |    |
| Input Current                  | "H" Level       | I <sub>IH</sub>   | V <sub>IH</sub> =18V   | 18    | -    | 0.3   | -     | 10 <sup>-5</sup>  | 0.3   | -    | 1.0   | μA |
|                                | "L" Level       | I <sub>IL</sub>   | V <sub>IL</sub> =0V    | 18    | -    | -0.3  | -     | -10 <sup>-5</sup> | -0.3  | -    | -1.0  |    |
| 3-State Output Leakage Current | "H" Level       | I <sub>DH</sub>   | V <sub>OUT</sub> =18V  | 18    | -    | 0.5   | -     | 10 <sup>-4</sup>  | 0.5   | -    | 30    | μA |
|                                | "L" Level       | I <sub>DL</sub>   | V <sub>OUT</sub> =0V   | 18    | -    | -0.5  | -     | -10 <sup>-4</sup> | -0.5  | -    | -30   |    |
| Quiescent Device Current       | I <sub>DD</sub> | V <sub>IN</sub> =V <sub>SS</sub> , V <sub>DD</sub><br>*   | 5                      | -     | 4.0  | -     | 0.002 | 4.0               | -     | 30   | μA    |    |
|                                |                 |   | 10                     | -     | 8.0  | -     | 0.004 | 8.0               | -     | 60   |       |    |
|                                |                 |   | 15                     | -     | 16.0 | -     | 0.008 | 16.0              | -     | 120  |       |    |

\* All valid input combinations.

# TC5012BP/BF

DYNAMIC ELECTRICAL CHARACTERISTICS (Ta=25°C, VSS=0V, CL=50pF)

| CHARACTERISTIC                              | SYMBOL           | TEST CONDITION      | V <sub>DD</sub> (V) | MIN. | TYP. | MAX. | UNITS |
|---|------------------|---------------------|---------------------|------|------|------|-------|
| Output Transition Time<br>(Low to High)     | t <sub>TLH</sub> |                     | 5                   | -    | 130  | 400  | ns    |
|   |                  |                     | 10                  | -    | 65   | 200  |       |
|   |                  |                     | 15                  | -    | 50   | 100  |       |
| Output Transition Time<br>(High to Low)     | t <sub>THL</sub> |                     | 5                   | -    | 70   | 200  |       |
|   |                  |                     | 10                  | -    | 40   | 100  |       |
|   |                  |                     | 15                  | -    | 35   | 80   |       |
| Propagation Delay Time<br>(IN - OUT)        | t <sub>pLH</sub> |                     | 5                   | -    | 320  | 430  |       |
|   |                  |                     | 10                  | -    | 150  | 220  |       |
|   |                  |                     | 15                  | -    | 110  | 200  |       |
| Propagation Delay Time<br>(IN - OUT)        | t <sub>pHL</sub> |                     | 5                   | -    | 280  | 380  |       |
|   |                  |                     | 10                  | -    | 130  | 220  |       |
|   |                  |                     | 15                  | -    | 100  | 200  |       |
| Three State Disable Time<br>(DISABLE - OUT) | t <sub>pHZ</sub> | R <sub>L</sub> =1kΩ | 5                   | -    | 320  | 500  |       |
|   |                  |                     | 10                  | -    | 280  | 450  |       |
|   |                  |                     | 15                  | -    | 250  | 400  |       |
| Three State Disable Time<br>(DISABLE - OUT) | t <sub>pLZ</sub> | R <sub>L</sub> =1kΩ | 5                   | -    | 420  | 600  |       |
|   |                  |                     | 10                  | -    | 320  | 500  |       |
|   |                  |                     | 15                  | -    | 270  | 450  |       |
| Three State Disable Time<br>(DISABLE - OUT) | t <sub>pZH</sub> | R <sub>L</sub> =1kΩ | 5                   | -    | 280  | 400  |       |
|   |                  |                     | 10                  | -    | 140  | 200  |       |
|   |                  |                     | 15                  | -    | 120  | 180  |       |
| Three State Disable Time<br>(DISABLE - OUT) | t <sub>pZL</sub> | R <sub>L</sub> =1kΩ | 5                   | -    | 300  | 450  |       |
|   |                  |                     | 10                  | -    | 150  | 225  |       |
|   |                  |                     | 15                  | -    | 130  | 200  |       |
| Input Capacitance                           | C <sub>IN</sub>  |                     |                     | -    | 7.5  | 15   | pF    |

WAVEFORM FOR MEASUREMENT OF DYNAMIC CHARACTERISTICS

